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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/669,360	09/25/2003	Yun-Woo Nam	277/017	3357

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LEE & STERBA, P. C.  
Suite 2000  
1101 Wilson Boulevard  
Arlington, VA 22209

EXAMINER
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VINH, LAN

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 02/22/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

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<b>Office Action Summary</b>	<b>Application No.</b> 10/669,360	<b>Applicant(s)</b> NAM ET AL.	
	<b>Examiner</b> Lan Vinh	<b>Art Unit</b> 1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 14 December 2005.  
 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.  
 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-30 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
 6) ☒ Claim(s) 1-3,8-17 and 21-29 is/are rejected.  
 7) ☒ Claim(s) 4-7,18-20 and 30 is/are objected to.  
 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
 10) ☒ The drawing(s) filed on 9/25/2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) ☐ All b) ☐ Some \* c) ☐ None of:  
 1. ☒ Certified copies of the priority documents have been received.  
 2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>92605</u> . | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Response to Amendment/Argument***

1. Applicant's arguments, see pages 9-10 of the response, filed 12/14/2005, with respect to the rejection(s) of claims 18-20 have been fully considered and are persuasive. The rejection has been withdrawn. Applicant's arguments with respect to the rejection(s) of claims 1-3, 9-17 under 35 U.S.C 103(a) based on Polla and Ma are not persuasive as discussed below

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-3, 9-17, 21-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Polla et al (US 5,911,507) in view of Ma et al (US 6,677,709) and further in view of McNie et al (US 6,670,212)

Polla discloses a method for fabricating a PZT microdevice. The method comprises the steps of:

forming a sacrificial layer 64 on a silicon substrate (col 12, lines 58-60), the layer 64 is removed (fig.4P)

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sequentially depositing a membrane layer 14 of SiN, a lower electrode layer 16 (Ti), an active layer 20, and an upper electrode layer 18 ( Ti ) on the sacrificial layer (col 13, lines 20-59)

sequentially patterning the upper electrode layer, the active layer, and the lower electrode layer (col 14, lines 4-7)

depositing an upper protective layer 68 (SiN) to cover the upper electrode layer, the lower electrode layer, and the active layer (col 14, lines 24-35)

patterning the upper protective layer to be connected to the lower electrode layer and the upper electrode layer ( fig. 4O)

then depositing a connecting pad layer 66 and patterning the connecting pad layer to form a first connecting pad to be connected to the lower electrode layer and a second connecting pad to be connected to the upper electrode layer (col 14, lines 8-10; fig. 4O)

patterning the membrane layer to expose the sacrificial layer (fig. 4O)

removing the layer 64/sacrificial layer (col 14, lines 37-41)

Unlike the instant claimed inventions as per claims 1-3, Polla fails to specifically disclose forming a flexible substrate such as polymer

Ma discloses a method for forming MEMS device comprises the step of forming a flexible substrate such as polymer, thin glass or silicon (col 3, lines 20-25)

Hence, one skilled in the art at the time the invention was made would have found it obvious to modify Polla method of forming microdevice by forming a flexible substrate such as polymer as per Ma because Ma discloses that the MEMS (micro

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electromechanical system) can be fabricated on a flexible substrates such as silicon, polyester, polyimide (col 3, lines 21-23)

Polla also fails to specifically disclose depositing the layers by PECVD as required in claims 1, 11, 27

McNie discloses a method for fabricating micro-machine comprises the step of forming the layers in the structure by PECVD (col 7, lines 5-9)

One skilled in the art at the time the invention was made would have found it obvious to modify Polla method by depositing the layers by PECVD as per McNie because McNie discloses that preferably any layers provided within the insulating layer are formed using PECVD and PECVD processes occur at relatively low temperature when compared to other processes (col 7, lines 7-11)

The limitations of claims 10, 14, 15, 25 have been discussed above

Regarding claim 16, Polla discloses that the lower electrode layer 16 having a thickness of 0.05 micrometers (col 13, lines 36-38)

Regarding claim 9, Polla discloses that the layer 64/sacrificial layer having a thickness of 1.5-3.5 micrometer (col 12, lines 60-63)

Regarding claim 12, Polla discloses that the layer 14/membrane layer having a thickness of 0.25 micrometer (col 13, lines 25-26), which is less than 5 micrometer

Regarding claim 13, Polla discloses the step of dry etching to pattern the layer 14 (col 14, lines 4-5)

Regarding claim 17, Polla discloses that the upper electrode 18 having a thickness of 0.05 micrometers (col 13, lines 54-56)

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Regarding claim 23, Polla discloses forming layer 20/active layer of PZT having a thickness of 0.1-10 micrometer by sol-gel technique on the lower electrode layer 16 (col 13, lines 43-50; fig. 4O)

Regarding claims 24, 28, Polla discloses etching the layers 20 and 68 by wet etching (col 13, lines 63-64; col 14, lines 38-40)

Regarding claim 26, Polla discloses forming a upper protective layer having a thickness of 1000 nanometer/1 micrometer (col 18, lines 45-50)

4. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Polla et al (US 5,911,507) in view of Ma et al (US 6,677,709) and McNie et al (US 6,670,212) and further in view of Marcus et al (US 6,245,444)

Polla as modified by Ma and McNie have been described above. Unlike the instant claimed invention as per claim 8, Polla and Ma, McNie fail to disclose forming the sacrificial layer of polyimide

Marcus discloses a method for fabricating a micro-element comprises the step of forming a sacrificial layer of polyimide (col 12, lines 55-57)

One skilled in the art at the time the invention was made would have found it obvious to modify Polla and Ma, McNie method by forming a sacrificial layer of polyimide as per Marcus because Marcus discloses that a micromachined element is produced by depositing a sacrificial layer such as polyimide (col 12, lines 52-55)

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5. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Polla et al (US 5,911,507) and Ma et al (US 6,677,709) in view of McNie et al (US 6,670,212) and further in view of Bartlett et al (US 5,834,975)

Polla as modified by Ma and McNie have been described above. Unlike the instant claimed invention as per claim 29, Polla and Ma, McNie fail to disclose performing the PECVD process to a temperature not exceeding about 400 degree C

Bartlett discloses a method for forming an integrated circuit comprises a step of performing a PECVD at 250 degree C (col 10, lines 50-55)

One skilled in the art at the time the invention was made would have found it obvious to modify Polla and Ma, McNie method by performing the PECVD as per Bartlett because Bartlett discloses that the PECVD is preferably performed at a low process temperature of about 250 degree C (col 10, lines 53-55)

#### ***Allowable Subject Matter***

4. Claims 4-7, 18-20, 30 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

#### ***Response to Arguments with respect to Polla and Ma***

5. Applicant's arguments with respect to the rejection(s) of claims 1-3, 9-17 under 35 U.S.C 103(a) based on Polla and Ma are not persuasive

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In response to applicant's argument that there is no suggestion to combine the references of Polla and Ma, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, since the motivation to combine the references comes from Ma ( Ma discloses that a substrate of a MEMS device can be a flexible substrate such as polymer, thin glass or silicon ), one skilled in the art would have found it obvious to employ Ma teaching in Polla method of forming a MEMS device to produce the claimed invention

The applicants argue that the Ma reference teaches away from using flexible substrates in processes such as those used in the Polla because the Polla reference requires that the PZT structure be cured at a temperature greater than 550 degree C, and preferably about 650 degree C while Ma et al. reference discloses that high temperature fabrication processes generally prevent any organic substrate from being used because the organic substrates break down at high temperatures. This argument is unpersuasive because while it is true that Ma discloses that high temperature fabrication processes generally prevent any organic substrate from being used, it is also true that Ma does not define how high is the "high temperature" ? Thus, "high temperature", as taught by Ma, could be much higher temperature than/does not include



the temperature ranges disclosed by Polla. Hence, the examiner asserts that Ma reference does not teach away Polla.

It is argued that there is no suggestion to combine the references of Polla and Ma because the MEMS device disclosed in Ma is not a PZT-based device. This argument is unpersuasive because while it is true that the MEMS device disclosed in Ma is not a PZT-based device, it is also true that PZT-based device is a microelectromechanical based device. Since both Polla and Ma are analogous arts, one skilled in the art would have found it obvious to combine teachings of Polla and Ma to produce the claimed invention

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

***Conclusion***

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is 571 272 1471. The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571 272 1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



LV  
February 19, 2006